

PANEL B3: STAR FORMATION

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ABSTRACT

We summarize several concepts discussed as possible key projects in the area of 'Star Formation' during the panel deliberations on star-formation and the interstellar medium. We also mention some more global issues that came up briefly during the discussion.

Key words: Stars: formation – Missions: FIRST (Herschel) – macros: L^AT_EX

1. INTRODUCTION

The star-formation panel met over a two-day period for several hours each in combination with the interstellar-matter panel to discuss possible ideas for Key Projects. The discussion on ideas associated with star formation centered around several possible very large projects that involve wide area, unbiased surveys, and some smaller projects that can be characterized as survey observations of certain classes of young stars or interstellar clouds. The projects listed below represent a summary of the ideas discussed, but should certainly be viewed as representative concepts rather than a well-defined or prioritized plan. The time scales attached are only very rough numbers that are probably accurate to about a factor of 2.

2. SAMPLE KEY PROJECTS

2.1. - IMAGING SURVEY OF THE NEARBY ISM

This is a project aimed at studying a large fraction of both active and quiescent regions in nearby ($d < 500$ – 1000 pc) molecular clouds. The survey would be carried out to the Galactic confusion limit, covering roughly 500 deg^2 with SPIRE (~ 500 hours, to rms ~ 10 – 25 mJy) and about 50 deg^2 with PACS (~ 300 hours, to rms ~ 5 – 10 mJy). The scientific drivers for this are numerous, and include issues with the earliest, least luminous and shortest phases of star formation as well as with details of the small scale structure of the diffuse ISM (see, e.g., André and Johnstone et al. in this volume).

2.2. - GALACTIC PLANE SURVEY

This is a project to make a completely unbiased survey of the richest part of the Galactic Plane covering, for example, an area of $\sim 5^\circ \times 360^\circ$ (1800 deg^2 , ~ 350 hours to rms ~ 50 mJy). The survey would utilize the rapid mapping capability of SPIRE and would be taken with the maximum scanning speed of the satellite (1 deg/min). The scientific drivers for this involve issues of star formation over a very wide range of masses and galacto-centric radii, as well as large scale structure of the Galactic disk and the Galactic Center.

2.3. - SPECTRO-IMAGING OF SAMPLE CLASSES OF YSOs

This project would involve making high spatial resolution photometric ($R \sim 4$) and spectroscopic ($R \sim 1700$) images of a statistically significant number of sources in a wide range of mass regimes with PACS. A likely lower limit to the scope of this project is roughly 400 sources (including some discovered by the photometric surveys) at 1 hour per source. It is possible to image the same area with $R \sim 20$ – 100 and the full spectral coverage of the SPIRE FTS at little cost in observing time. The scientific drivers for this program are to collect a database on known young stellar objects that can be used for a host of followup detailed studies on dust and gas structure and dynamics as a function of evolutionary state (e.g. Henning et al. and Saraceno et al., this volume).

2.4. - IMAGES OF MSX-SHADOW GLOBULES

This program is an example of a set of observations targeted at a specific and poorly understood type of object that is almost certainly related to the earliest stages of star formation. By the time FIRST (Herschel) is launched, it is likely that other similar classes of objects will have been discovered by e.g., SIRTf, ELISA (Ristorcelli et al., this volume), BLAST (Scott et al., this volume), ASTRO-F (Nakagawa, this volume), and Planck (Puget, this volume) itself. In the case of the MSX globules the high optical depth in the mid-infrared implies that only high sensitivity and high spatial resolution observations in the far-infrared and submillimeter can see to their cores. This program would involve spectro-imaging roughly 300 sources at $\sim 1/2$ hour per source.

3. SOME LARGER ISSUES

The panel also discussed briefly some larger issues that pertain to more global aspects of the Key Project program. For example, it was felt strongly that the various Call For Proposals (CFP's) must be structured to provide for followup observing, particularly of objects discovered in the various surveys that are likely to be part of the Key Project program. It was also suggested that there may well be some programs that are so important that they should be completed early to insure a certain level of scientific return from FIRST (Herschel). Another concept suggested for consideration was the idea of holding some time in reserve to be used to allow programs to provide a more uniform database than conceived in the original proposal, e.g., a more complete sample of sources than required in the original scientific program.

Finally, there was a brief discussion of the issues involved with the ESA suggestion that a 'significant fraction' of guaranteed time be utilized as part of the Key Project program.